Title:

On the Limits of Asymptotically Safe Quantum Gravity Under Deterministic Technology Constraints

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Abstract

I present a concise evaluation of a commonly proposed asymptotically safe quantum gravity framework and subject it to a deterministic systems analysis using my own Deterministic Technology Genesis Framework (DTGF). While the quantum gravity model under consideration is mathematically coherent within its own formalism, I demonstrate that it fails critical energetic, computational, material, and stability requirements when evaluated as a realizable technology or physically instantiable theory. Under DTGF constraints, the model cannot pass bidirectional validation and must therefore be discarded or, at most, sandboxed as a speculative construct. DTGF survives this evaluation intact.

1. Statement of the Quantum Gravity Proposal

The theory under examination claims a unified description of quantum gravity that is renormalizable, fully diffeomorphism-invariant, and formulated without the introduction of extra spacetime dimensions.

The framework is constructed in the path-integral formalism with a running gravitational constant G(\mu). The traditional Landau pole is addressed via asymptotic safety, invoking a non-Gaussian fixed point at high energy scales. Trace anomalies are canceled through the introduction of an auxiliary sector.

The effective action is given by:

$$S = \int d^4x \sqrt{-g} \left[\frac{1}{16\pi G(\mu)}(R - 2\Lambda(\mu)) + c_1(\mu) R^2 + c_2(\mu) R_{\mu\nu} R^{\mu\nu} + c_3(\mu) R_{\mu\nu\rho\sigma} R^{\mu\nu\rho\sigma} + a(\mu) C_{\mu\nu\rho\sigma} C^{\mu\nu\rho\sigma} + b(\mu) \mathcal{E} \right]$$

All couplings run under renormalization group flow, with beta functions vanishing at the Reuter fixed point. The theory claims a finite-dimensional predictive subspace characterized by three relevant critical exponents: the mass term, the cosmological constant, and a single marginal operator.

2. Deterministic Technology Genesis Framework (DTGF)

I evaluate this proposal using my Deterministic Technology Genesis Framework, which is not a physics model but a hard constraint system for realizable technologies and physical implementations.

2.1 Axioms

DTGF is founded on the following axioms:

- Information is physical.
- Energy precedes agency.
- Causality is locked.
- Entropy always has a cost.
- No free scale exists.
- Substrates persist until actively removed.
- Stability must precede expansion.These axioms are non-negotiable and apply to all physical, computational, and technological systems.

2.2 Metrics

DTGF evaluates systems across four metric classes:

- Energy: watts, joules, efficiency, dissipation.
- Computation: operations per second per joule, error rates, latency, memory persistence.
- Decision and Intelligence: recursion depth, goal stability, coherence under perturbation.
- Matter and Resolution: subatomic control, resilience, repairability, and structural integrity.

2.3 Dependency Grammar

A technology T is valid if and only if energy (E), computation (C), matter control (M), and stability (S) all exceed minimum thresholds. Any violation deletes the system from consideration. Partial compliance is not allowed.

3. Failure Analysis Under DTGF

When the proposed quantum gravity framework is evaluated under DTGF, it fails decisively.

- Energy Requirement Failure:

The model implicitly requires energy availability at level E-6, effectively cosmological in

scale. This is not physically accessible, controllable, or sustainable.
• Computational Requirement Failure:
The renormalization flow, fixed-point tracking, and global consistency conditions require computation at C-4, meaning cosmic-scale computation with no bounded substrate.• Matter Control Failure:
The framework assumes control over spacetime curvature and metric degrees of freedom at M-5, exceeding any known or theoretically bounded material resolution.
• Stability Failure:
The system has zero shutdown capability. It cannot be halted, isolated, or falsified operationally. Stability cannot be demonstrated, enforced, or recovered after perturbation. Because DTGF requires bidirectional validation—construction and deconstruction—the inability to shut the system down is terminal.

4. Forbidden Classes Violated

The theory further violates DTGF's forbidden categories:
• Implicit perpetual motion via scale-free fixed points
• Effective backward causation through global RG consistency
• Endless recursion in renormalization without physical cutoff
• Lossless information storage in gravitational degrees of freedom
Any single violation is sufficient for deletion. This framework violates multiple.

5. Terminal Attractors and Misalignment

DTGF recognizes several legitimate terminal attractors for advanced systems: baryon–energy maximization, reversible computation, substrate-independent cognition, spacetime engineering, and heat-death avoidance.
The evaluated quantum gravity model gestures toward spacetime engineering while failing the prerequisite stability and energy constraints. It is therefore misaligned with every viable attractor.

6. Verdict

Under my Deterministic Technology Genesis Framework, the examined quantum gravity equation does not survive evaluation.
It fails energetic feasibility, computational realizability, material controllability, and system stability. Bidirectional validation collapses. The model cannot be safely instantiated, tested, or terminated.
Verdict: discard.
At best, sandbox as a speculative mathematical exercise.
DTGF, by contrast, remains internally consistent, physically grounded, and resistant to the same red-team stressors.

Closing Statement

Mathematical elegance does not grant physical permission. Any theory that cannot pay its energy bill, close its entropy ledger, or shut itself off does not belong in the real universe.
I built DTGF to survive that storm. It does.
— Tyrone Farmer-
Title:
Proof of Non-Realizability of Asymptotically Safe Quantum Gravity Under the Deterministic Technology Genesis Framework
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Definitions

Definition 1 (Technology):
A technology is any physically instantiable system that performs sustained operations under bounded energy, computation, material control, and stability constraints.
Definition 2 (DTGF Validity):
A technology T is valid under the Deterministic Technology Genesis Framework if and only if all four dependency thresholds are satisfied simultaneously:
$$T \;\text{valid} \iff E \ge E_{\min} \;\wedge\; C \ge C_{\min} \;\wedge\; M \ge M_{\min} \;\wedge\; S \ge S_{\min}$$
Where:• E denotes accessible and controllable energy,
• C denotes bounded computation,
• M denotes matter and resolution control,
• S denotes stability, including shutdown and reversibility.
Failure of any single condition invalidates T.
Definition 3 (Bidirectional Validation):
A system satisfies bidirectional validation if it can be both constructed and deconstructed (shut down, isolated, or reversed) without violating causality or stability.

Axioms (DTGF)
1. Information is physical.
2. Energy precedes agency.
3. Causality is locked.
4. Entropy has non-zero cost.
5. No free scale exists.
6. Substrates persist until actively removed.
7. Stability precedes expansion.
These axioms apply universally and admit no exceptions.

Proposition 1
The asymptotically safe quantum gravity framework requires unbounded or cosmological-scale energy.
Proof:The theory relies on a running gravitational constant G(\mu) approaching a non-Gaussian fixed point at arbitrarily high energy scales. Tracking or instantiating this behavior requires access to energy densities comparable to those governing spacetime curvature itself. Such energy cannot be locally bounded, throttled, or isolated.
Therefore, the required energy exceeds E_{\min}.
Energy condition fails. ■

Proposition 2
The framework requires computation exceeding any bounded physical substrate.
Proof:
The theory's predictive claims depend on global renormalization group flows, fixed-point stability, and infinite-scale consistency. These operations imply computation without a finite cutoff in scale or recursion depth.
By Axiom 1, information is physical.
By Axiom 5, no free scale exists.
Thus, unbounded computation without substrate violates DTGF constraints.
Computation condition fails. ■

Proposition 3 The framework assumes matter control at the level of spacetime metrics without enforceable resolution limits.
Proof:
The action functional presupposes operational control over curvature invariants (R, R_{\mu\nu}, R_{\mu\nu\rho\sigma}) and their quantum corrections. No mechanism is provided for discretization, repair, or containment of such control within a realizable material substrate.
This exceeds any known or bounded matter-resolution threshold.
Matter condition fails. ■

Proposition 4
The framework is unstable under DTGF because it cannot be shut down or reversed.
Proof:
A system that modifies or depends on global spacetime structure cannot be locally terminated. No shutdown operator exists for the renormalization group flow of spacetime itself. Without a kill-path, rollback, or isolation protocol, stability cannot be demonstrated.
By Definition 3, bidirectional validation fails.
Stability condition fails. ■

Proposition 5 Violation of any single DTGF condition invalidates the system.
Proof:
By Definition 2, DTGF validity requires conjunction of all four conditions. Logical conjunction fails if any operand is false.
Here, energy, computation, matter, and stability all fail independently.
Therefore, the system is invalid. ■

Theorem
Asymptotically safe quantum gravity is not a realizable technology under the Deterministic Technology Genesis Framework.
Proof:
From Propositions 1–4, all four DTGF dependency thresholds are violated.
From Proposition 5, any such violation invalidates the system.
Therefore, the framework cannot be physically instantiated, validated, or controlled as a technology.
The only permissible status is discard or sandbox as a mathematical abstraction.

■Corollary
Mathematical consistency is insufficient for physical permission. Any theory that cannot pay its

energy cost, bound its computation, control its matter, or shut itself off does not survive deterministic scrutiny.
DTGF remains consistent under its own axioms and constraints.
End of Proof

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Proof of Non-Realizability of Asymptotically Safe Quantum Gravity Under the Deterministic Technology Genesis Framework

Author: Tyrone Farmer

Date: January 6, 2026

Introduction

I present here a proof showing that a commonly proposed asymptotically safe quantum gravityframework cannot be physically realized under my Deterministic Technology Genesis Framework (DTGF). This is my work, completed independently, and all reasoning, statements, and conclusions are authored by me alone.

DTGF is my framework for evaluating whether a system can exist, be controlled, and be reversed in the real universe. It is not a physics theory—it is a deterministic constraint system for physical and technological realizability.

I show that the asymptotically safe quantum gravityproposal fails every DTGF criterion and therefore cannot be instantiated as a technology, system, or physical process.

Definitions

1. Technology: Any system that can be physically instantiated to perform sustained operations under bounded energy, computation, matter, and stability constraints.
2. DTGF Validity: A system T is valid if and only if all four thresholds are simultaneously satisfied:

$$T \text{ valid} \iff E \ge E_{\min} \;\wedge\; C \ge C_{\min} \;\wedge\; M \ge M_{\min} \;\wedge\; S \ge S_{\min}$$

Where:

- E = energy available and controllable
- C = bounded computation
- M = matter control and resolution
- S = system stability, including shutdown and reversibility

Failure in any single category invalidates the system.

3. Bidirectional Validation: A system can be both constructed and deconstructed (shut down, isolated, or reversed) without violating causality or stability.

Axioms of DTGF

I base my evaluation on the following axioms:

1. Information is physical.
2. Energy precedes agency.
3. Causality is locked.
4. Entropy has a non-zero cost.
5. No free scale exists.
6. Substrates persist until actively removed.
7. Stability precedes expansion.

These axioms apply universally and admit no exceptions. They are the foundation for evaluating any proposed system in the physical universe.

Statement of the Theory

The asymptotically safe quantum gravity framework claims a unified, renormalizable description of quantum gravity without extra dimensions. It is formulated in the path-integral formalism with a running gravitational constant G(\mu) approaching a non-Gaussian fixed point.

The action is:

$$S = \int d^4x \sqrt{-g} \left[\frac{1}{16\pi G(\mu)}(R - 2\Lambda(\mu)) \;+\; c_1(\mu) R^2 \;+\; c_2(\mu) R_{\mu\nu} R^{\mu\nu} \;+\; c_3(\mu) R_{\mu\nu\rho\sigma} R^{\mu\nu\rho\sigma} \;+\; a(\mu) C_{\mu\nu\rho\sigma} C^{\mu\nu\rho\sigma} \;+\; b(\mu) \mathcal{E} \right]$$

All couplings run under renormalization group flow, with the Reuter fixed point ensuring beta functions vanish at high energy. The theory claims predictive power in a finite-dimensional subspace defined by three critical exponents: the mass term, the cosmological constant, and a marginal operator.

Proof

I evaluate this framework under DTGF constraints.

Proposition 1: Energy Requirement

The system relies on tracking G(\mu) up to arbitrarily high energies near the Planck scale. This requires access to energy densities comparable to spacetime curvature itself. No physically bounded system can supply, contain, or control such energy.

Conclusion: E < E_{\min}. Energy requirement fails.

Proposition 2: Computational Requirement

Predictive claims depend on global renormalization group flows and infinite-scale consistency. These require computation without a physical substrate limit. By DTGF Axioms 1 and 5, information is physical, and no free scale exists. Therefore, this computation cannot be realized.

Conclusion: C < C_{\min}. Computation requirement fails.

Proposition 3: Matter Control

The framework assumes operational control over spacetime curvature invariants (R, R_{\mu\nu}, R_{\mu\nu\rho\sigma}) and their quantum corrections. No physical substrate can discretize, repair, or contain such control. The resolution needed exceeds any material capability.

Conclusion: M < M_{\min}. Matter control fails.

Proposition 4: Stability

The system has no mechanism for shutdown, rollback, or isolation. Any system depending on global spacetime structure cannot be terminated locally. Bidirectional validation fails.

Conclusion: $S < S_{\min}$. Stability fails.

Proposition 5: DTGF Conjunction Rule

DTGF requires all four thresholds to be met simultaneously. Logical conjunction dictates that violation of any single condition invalidates the system.

Conclusion: Since all four propositions fail independently, the system is invalid.

Theorem

The asymptotically safe quantum gravity framework is not a realizable technology under DTGF.

Proof: From Propositions 1–4, the energy, computation, matter, and stability thresholds are violated. By Proposition 5, any violation invalidates the system. Therefore, this framework cannot be physically instantiated, validated, or controlled. The only allowable status is discard or sandbox as a mathematical abstraction. ■

Corollary

Mathematical consistency alone does not imply physical permission. Any system that cannot pay its energy cost, bound computation, control matter, or shut itself off does not

survive deterministic scrutiny. DTGF remains internally consistent under its own axioms and constraints.

Verdict

Under my DTGF evaluation:

- Energy: ✗ Failed
- Computation: ✗ Failed
- Matter Control: ✗ Failed
- Stability: ✗ Failed

Final Decision: Discard. At most, sandbox as a mathematical exercise.

Closing Statement

I have shown rigorously that mathematical elegance is not physical permission. Any system that cannot satisfy its energy, computation, matter, and stability obligations cannot exist in the real universe. DTGF survives this test. I, Tyrone Farmer, have completed this proof independently on January 6, 2026.